

NFS 2183 Introduction to Biochemistry

Fall 2023

Mon/Wed/Fri 3:30pm – 4:20pm

Jeffords 110

Instructor Information

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Help Times (aka Office Hours)

Wednesdays 5:15pm – 6:15pm
Thursdays 11:00am – 12:00pm
or email me to arrange another time to meet

What's This Course About?

We all know that we need to eat (i.e. take in food as energy) to stay alive. But how does that food get converted from, say a potato or olive oil, to a form of energy that can actually be used by cells? Despite what some vitamin commercials say, your cells don't get hungry or snack on bits of the food you eat! Biochemistry explores the enormous number of chemical reactions in our bodies involved in transforming energy – converting energy present in the foods we eat to a form that's usable by cells, and storing excess energy for later. Collectively, these reactions are what we refer to as “metabolism.” For this course, we'll skip over digestion and start at the molecular level, focusing on metabolism of the two main energy molecules in cells, carbohydrates and lipids (aka fats). As we'll see, if left alone, the chemical reactions involved in metabolism would occur VERY slowly. That's where enzymes come in – proteins that ramp up rates of cellular reactions. We'll also explore how metabolic processes are controlled in our bodies to make sure we're not using up energy we might need later or storing energy we need right now. At the end of the course, we'll look at a different set of pathways to explore how our genetic information (i.e. DNA) is copied and used to direct the formation of proteins. Throughout the class, we'll see how an understanding of biochemistry can answer questions such as: Why is carbon monoxide so toxic? What's the rationale behind carbo-loading? Why do fats yield more calories per gram than carbohydrates?

Prerequisites: CHEM 1580 or CHEM 2580/2585 or acceptable coursework in organic chemistry.

What Will You Learn in This Course?

By the end of this course, you should be able to...

- Describe how the structures and properties of cellular molecules relate to their functions in cells
- Explain how enzymes increase rates of cellular reactions and how their activity is controlled in cells
- Describe the metabolic pathways involved in synthesis and breakdown of carbohydrates and lipids
- Explain how regulation of carbohydrate and lipid metabolism helps ensure appropriate energy use and storage
- Describe how genetic information is replicated and used to direct the synthesis of proteins in cells
- Apply your knowledge to predict and explain the outcomes of disruptions or alterations to the cellular processes we discuss

What Do You Need for This Course?

- 1) *Biochemistry: Concepts and Connections*, 2nd edition by Appling, et al. (electronic or physical textbook)
- 2) Mastering Chemistry access (online platform for homeworks)
- 3) iClicker Student access – *free* for all UVM students
- 4) Calculator – any kind is fine

Mastering Chemistry with eText access is available from the publisher's website (see [here](#)). **Heads up:** Mastering Chemistry access is textbook AND edition specific; make sure you purchase access for the right textbook. Instructions for joining our Mastering Chemistry course are posted on Brightspace. You need to join our course and complete the *introductory assignment by midnight on Tuesday, September 5*.

Additionally, you'll need access to iClicker Student, the web-app-based version of iClicker. It's *free* to UVM students, and instructions for getting set up are posted on Brightspace. We won't use iClicker remotes, so you'll need to bring a laptop, tablet, or your phone (with the iClicker app) to class. Make sure you get set up with iClicker Student before or second class on *Wednesday, August 30*.

Plan on bringing a calculator to class. While we won't be doing a ton of calculations, they will pop up from time to time. A simple calculator or graphing calculator is fine; just don't plan on using your phone.

What Resources Are Provided to Support Your Learning?

General Resources

- *Me (Professor Almstead)*: Got questions? Let me know! I am always available by email and make it a priority to respond as promptly as I can. My help times and the few minutes before or after class are the easiest times to catch me in person. You can also send me an email to arrange another time to chat.
- *Tips for success*: See the document posted on Brightspace with study strategies that have helped students succeed and excel in the course. These techniques will give you the most "bang for your buck" in terms of learning gains vs. time invested.

Pre-Class Resources

- *Readings*: To prepare for class, complete the readings indicated in the annotated list on Brightspace. The readings are drawn from our textbook as well as other sources. Focus on becoming familiar with the main concepts and new terminology; you shouldn't spend time outlining every detail.
- *Vocab lists*: A list of important vocabulary words will be posted on Brightspace before we begin a new topic in class. Review the terms and define/explain them before we discuss the material in class. A basic understanding of the terms will make it easier to understand what we discuss.
- *Class handouts*: Class handouts will be available on Brightspace at least 24 hours before each class. They're edited versions of the class slides with some information omitted, and are designed to facilitate note taking. Reviewing the handout is also a good way to prepare for class because it gives you an overview of what we'll discuss.

Post-Class Resources

- *Complete class slides and associated materials:* A PDF with all slides from class plus any in-class materials (e.g. videos; worksheets) will be posted after each class; typically within a couple hours. The class slides are helpful for filling in any gaps in your notes.
- *Class follow-up questions:* Consider these like end-of-chapter questions in a textbook – they're questions that you should be able to answer based on concepts covered in class. Questions for each class will be provided at the end of the class handouts and class slides PDFs and posted as a separate document. Answering the follow-up questions will give you practice applying the concepts, and can help you assess your understanding of the material. Because the goal of the questions is to help you identify areas of confusion and practice applying the material in your own words (i.e. not memorizing the answers), keys are not provided. But don't hesitate to reach out to ask about them! Send me an email, chat with me before or after class, and/or swing by my help times to talk about questions you're stuck on or to check some of your answers.
- *Readings – as a reference:* You are responsible for the material we cover in class. Some readings have additional information, and some of what we discuss is not directly covered in the readings. Use the readings as a reference after class; don't get lost in additional details or forget to review material we discussed that's missing from the readings.

What's Expected of You in This Course?

- *Come to class and stay engaged.* Coming to class is obviously your choice, no one can force you to attend. That said, attending and being engaged in class will help you succeed. You are responsible for the material we discuss in class whether or not it's covered in your textbook or spelled out on the slides PDFs posted after class. Additionally, class is a great time to ask questions as we go through the material. In-class activities also contribute to a portion of the engagement component of your grade.
- *Help create a positive learning environment.* Do your part to help create a classroom environment that facilitates learning. This includes:
 - refraining from distracting behaviors (e.g. texting; checking social media; arriving late; doing other work)
 - respecting and encouraging your classmates (e.g. inviting others to contribute to small group discussions)
 - contributing to class (e.g. asking questions; volunteering answers to questions)
- *Communicate and check your email.* As indicated in multiple other parts of this syllabus, questions are always welcome – before/during/after class, via email, and during my help times. One of my favorite things about teaching is getting to know students, so I love when people stop by just to say hi or reach out to tell me about themselves. Reminders, announcements, and updates will be sent to your UVM email address; check it daily or have it forwarded to an email account you check frequently.

What Can You Expect from Me?

My main goal is to have you complete the course with a lasting understanding of the material and an appreciation for the importance of biochemistry in nutrition. To achieve that goal, I will strive to be as clear as possible in conveying the material and describing expectations, provide resources to support your learning, welcome and answer any questions you have, and give frequent reminders about upcoming due dates, etc. Biochemistry is far from a “no brainer.” I expect you to have questions and want you to reach out if anything is unclear!

How Will You Know If You're Learning?

You have some flexibility in demonstrating your understanding in this course. A brief overview of the components and their contribution towards your final grade is provided below followed by more detailed descriptions. To maintain fairness, individual extra credit is not an option and scores will not be curved. To allow some flexibility in considering your overall progression in the course, the scale for final letter grades will be determined at the end of the semester; it will not be more stringent than standard cutoffs. For ALL assessments, you are expected to demonstrate your own understanding. Academically dishonest behaviors are not fair to your classmates and will be reported to the Center for Student Conduct.

Engagement (in-class participation; discussion board)	15%
Homeworks	25%
<u>Quizzes or Cumulative Final</u>	<u>60%</u>
TOTAL	100%

Engagement

Actively engaging with the material in and outside of class helps promote deeper and longer-lasting understanding. In-class engagement will include questions to which you'll respond via the iClicker Student app as well as a few worksheets and comparison activities. The questions and activities are designed to help you develop your application, analysis, and evaluation skills using the concepts we discuss in class. Additionally, they'll allow both you and me to assess your preparation for class and understanding of new material. For engaging outside of class, we'll use Yellowdig, a discussion board platform. Contributions will focus on asking and answering questions, summarizing important points from class, and sharing helpful study resources.

Each week, your goal is to earn a total of 900 engagement points through a combination of iClicker responses/in-class activities and Yellowdig contributions for a total of 12,200 points by the end of the semester (14 weeks times 900 with a buffer to account for days where there are no classes). While you can't reach 900 points by just doing one or the other, additional Yellowdig contributions can make up for some missed classes and iClicker questions.

- iClicker questions are each worth a total of 100 points – 50 for responding and 50 for having the correct answer. Other in-class activities will be worth 100 points. There will be a minimum of six opportunities per week (600 points if you answer all questions correctly).
- Yellowdig posts are worth 100 points and comments are worth 75 points. You should aim for 300 points per week and can earn a maximum of 375 points each week. See the Yellowdig content area on Brightspace for additional details.

So, what does this mean in terms of points? On a typical week (i.e. max. 600 in-class points), you should contribute to Yellowdig three to four times to reach 300 points (e.g. three posts; four comments), assuming you get all the iClicker questions correct. You can earn an extra 75 points per week to make up for missed/incorrect iClicker questions via an extra Yellowdig contribution; some weeks there may also be more than 600 possible in-class points. In-class engagement points will be posted on Brightspace and updated after each class. Your Yellowdig points are visible when you visit the discussion board.

Homeworks

Learning is not a one-and-done activity. Homeworks provide a structured way for you to practice applying what we discuss in class and assess your understanding of the material. Use your notes and the class slides

PDFs to help you work through the questions. You're also encouraged to reach out if you're stuck or aren't certain what a question is asking.

Homeworks will be provided via Pearson's [Mastering Chemistry](#). You need to register for Mastering Chemistry and join our course to access the assignments. Homeworks will be available by 5:00pm on Wednesdays and due the following Sunday before midnight (11:59pm) unless otherwise indicated in the Class Schedule. You can still earn some credit for questions submitted after the due date; it is always worth completing questions even if it's past the due date! Details on how questions are scored are provided under MC Homeworks – What, Why, and How on Brightspace and in Mastering Chemistry. An introductory assignment will give you an opportunity to see how Mastering Chemistry works, including how homeworks are scored in this course. The introductory assignment contributes to your Engagement points for the first week of class.

Quizzes and Cumulative Final Exam Option

Quizzes are an opportunity for you to demonstrate your knowledge and application skills. There will be 11 quizzes over the course of the semester, and your lowest score will be dropped; see the Class Schedule for dates. Each quiz will be 15 min. with approximately 10 questions. The questions will be a mix of multiple-choice, fill in the blank, select all, and short response. Just like your homeworks, questions will require you to use and apply what you've learned in class, not simply memorize information. The questions will focus on what we've covered since the previous quiz, and may include other related material we've discussed. Quizzes will be given at the beginning of class; if you're late, you'll have less time to complete them.

An optional cumulative final exam will be offered during finals week at a mutually agreed upon time. If you are not satisfied with your quiz average or want another opportunity to demonstrate your understanding, you can take the final. There will be roughly 50 questions and you'll have 2 hours to complete it. A majority of the questions will be multiple-choice with some other types (e.g. select all; short response). Your highest score – quiz average or final exam score – will count towards your final grade in the class. Taking the final cannot hurt your grade; it's your choice whether you wish to take it.

If you have a conflict with a quiz or the final, you need to notify me at least a week in advance so we can make other arrangements. Illnesses and last-minute emergencies will be handled on a case-by-case basis; please reach out BEFORE the quiz. The sooner you let me know about your situation, the easier it will be to work out an alternative plan.

[UVM Values and Policies](#) Below are links to various UVM policies you may find useful.

Promoting Health & Safety: It is our collective responsibility to support a healthy and safe community. Don't hesitate to reach out to the [Center for Health and Wellbeing](#) or [Counseling & Psychiatry Services \(CAPS\)](#) (802-656-3340). If you are concerned about a UVM community member or specific event, I encourage you to contact the Dean of Students Office (802-656-3380). You can also report your concerns anonymously online by visiting the [Dean of Students website](#).

Code of Student Conduct: This [policy](#) describes the University's expectations for students' responsibility in promoting the community's welfare.

Student Learning Accommodations: Any student with a documented disability interested in utilizing accommodations should contact SAS, the office of Disability Services on campus. SAS works with students and faculty in an interactive process to explore reasonable and appropriate accommodations, which are communicated to faculty in an accommodation letter. All students are strongly encouraged to meet with their faculty to discuss the accommodations they plan to use in each course. A student's accommodation letter lists those accommodations that will not be implemented until the student meets with their faculty to create a plan. https://www.uvm.edu/academicsuccess/student_accessibility_services

UVM's policy on disability certification and student support: See policy [here](#).

Religious Holidays: Students have the right to practice the religion of their choice. If you need to miss class to observe a religious holiday, please submit the dates of your absence to me in writing by the end of the second full week of classes. You will be permitted to make up work within a mutually agreed-upon time.

Athletic Conflicts: Student athletes need to notify me of any classes they may miss due to documented athletic conflicts by the end of the second week of the semester. Notify me of any changes to the schedule at least a week in advance. We will work together to create a plan that allows you to stay on top of the work for this class.

Academic Integrity: This [policy](#) addresses plagiarism, fabrication, collusion, and cheating. Violations will be reported to the Center for Student Conduct.

Grading and Grade Appeals: Information on grading and GPA calculation is available [here](#). The process for appealing a final course grade is [here](#).

FERPA Rights Disclosure: The purpose of this [policy](#) is to communicate the rights of students regarding access to, and privacy of their student educational records as provided for in the Family Educational Rights and Privacy Act (FERPA) of 1974.

Final exam policy: The University [final exam policy](#) outlines expectations during final exams and explains timing and process of examination.

Course Materials Property Rights: Students are prohibited from publicly sharing or selling academic materials that they did not author (for example: class syllabus, outlines or class presentations authored by the professor, practice questions, text from the textbook or other copyrighted class materials, etc.); and students are prohibited from sharing assessments (for example homework or a take-home examination). Violations will be handled under UVM's Intellectual Property policy and Code of Academic Integrity.